

Application No.:09/884,215

Atty. Dkt.: ZM921-04004

Page 8 of 11

**REMARKS**

Reconsideration of the pending application is respectfully requested. Claims 1-19, 21-22, and 48-50 remain pending in the present application. Claims 20 and 23-47 have been cancelled.

Applicants' Attorney appreciates the personal interview of March 23, 2005 regarding this matter. Applicant feels that all pending claims, as amended, are definable over the prior art.

**35 U.S.C. 112 Rejections**

The Examiner has rejected Claim 16-17, and 22-49 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, Examiner alleges that as to whether emitting the strands at a flow rate of 0.6 cubic centimeters per minute is intended. Claims 16, 22, and 49 are currently amended resolving any issue that may have been present. Additionally, remaining claims rejected under § 112 depend from one of these amended Claims. Therefore, Applicants' Attorney respectfully requests that the Examiner withdraw said rejections.

**35 U.S.C. 103 Rejections**

The Examiner has rejected Claims 1-19, 21-22, and 48-50 under 35 U.S.C. 103(a) as being unpatentable over Gogins et al (6,716,274)(hereinafter '274) in view of Chue et al. (6,713,011)(hereinafter '011). The Examiner alleges that '274 teaches the claimed invention except for the adjustment of the voltage depending on composition and the composition, the additive or copolymer, the addition of surfactant as claimed. Examiner then admits that '274

Application No.:09/884,215

Atty. Dkt.: ZM921-04004

Page 9 of 11

does not teach a sharp tip source or fiber rate of formation. However, Examiner alleges that all other claim limitations are either taught in '011 or are obvious in view of these two references. Applicant's Attorney respectfully traverses the Examiner on these grounds of rejection.

Examiner has agreed that the limitation of having at least one tapered tip is not taught in either of the references. See Interview Summary. Each independent Claim (1, 22, 48, 49, and 50) is currently amended to include electrospinning through capillary tubes having at least two sharp tapered tips. This is a unique and novel configuration of a capillary tube for electrospinning nanofibers and is the basis for the present invention for producing nanofibers at the size and rates claimed herein.

A primary problem in electrospinning nanofibers in the prior art is creating a nano sized fiber at a rate that is practical or economical. Unlike extrusion processes where an increase in the pressure or pump rate of material to the extruder or die increases the rate of production, an increase in the pressure of solution to a capillary tube alters the size and or shape of a fiber that may or may not be formed. Extrusion is often used to shape highly viscous or high solids content materials and is accomplished by pushing a material through a die. Conversely, electrospinning is used in forming a low solids content solution having a low viscosity into fibers. The differential in electrical charge between the solution at the outlet of the capillary tube and the fiber collection area pulls the solution from the capillary tube creating nanofibers. An increase in pump rate or capillary feed pressure of a solution in an electrospinning process undermines the pulling of the solution from the capillary tube and changes or increases the fiber size therefrom. Therefore, a reference in the extrusion arts having die or tip that may resemble

Application No.: 09/884,215  
Atty. Dkt.: ZM921-04004  
Page 10 of 11

the multi-tip capillary tube of the instant invention would be misplaced. Electrospinning and extrusion are very different arts and utilize different tips or dies for very different effects.

It has been discovered that an electrical charge placed on capillary tubes concentrates at sharp parts of the capillary tubes. By having multiple sharp tips at the exit of the capillary tube used in an electrospinning process, as currently claimed, the charge concentrates near the outlet of the capillary tube and provides a faster flow of solution there through at a desired nanofiber size. The use of capillary tubes in electrospinning nanofibers having a plurality of sharp tips is not taught, made obvious, nor remotely suggested in the cited prior art, as examiner has admitted. Additionally, any reference in the extrusion arts that Examiner may find having a die of similar shape would be misplaced since such a configuration would be selected to shape the extrude of a viscous material and not to concentrate an electric charge at the tip of a capillary tube to increase the production rate of nanofibers from a low viscosity solution. The extrusion and electrospinning arts are not analogous for the aforementioned reasons.

Since the claim limitation of having capillary tubes with at least two sharp tips for an electrospinning process, as incorporated into Claims 1, 22, 48, 49, and 50, is not taught in the prior art nor remotely suggested, Applicant's Attorney urges that each of these claims now overcome rejections raised by Examiner and respectfully requests Examiner to withdraw said rejections. Additionally, Claims 2-19 and 21 incorporate this limitation through claim dependency, hence; Applicant's Attorney urges these rejections raised by Examiner be withdrawn as well.

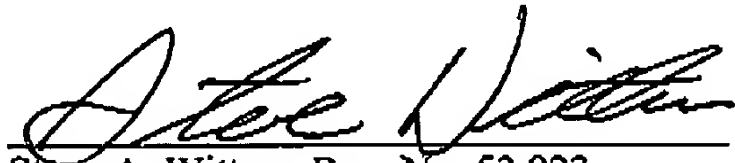
Application No.:09/884,215  
Atty. Dkt.: ZM921-04004  
Page 11 of 11

**Conclusion**

Applicant's Attorney urges that the instant application is now in condition for allowance. However, if the Examiner believes there are other unresolved issues in this case, Applicant's Attorney of record would appreciate a call at (502) 584-1135.

Respectfully submitted,

**MIDDLETON REUTLINGER**



Steve A. Witters, Reg. No. 53,923  
2500 Brown & Williamson Tower  
Louisville, KY 40202  
(502) 584-1135 phone  
(502) 561-0442 fax  
[switters@middreut.com](mailto:switters@middreut.com)

\*\*\*\*\*